

Visual Testing with PyCharm and pytest

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Visual Testing with PyCharm and pytest

a lot of ground to cover

- TDD in 5 slides
- why pytest
- why PyCharm
- demo as much as we can
- have fun



(courtesy <http://moonlander.seb.ly/>)

TDD crash course

Design->Develop->Test

doesn't work

and ... it's not fun

Test -> Design & Develop

way more fun

includes do-overs

TDD - traditional

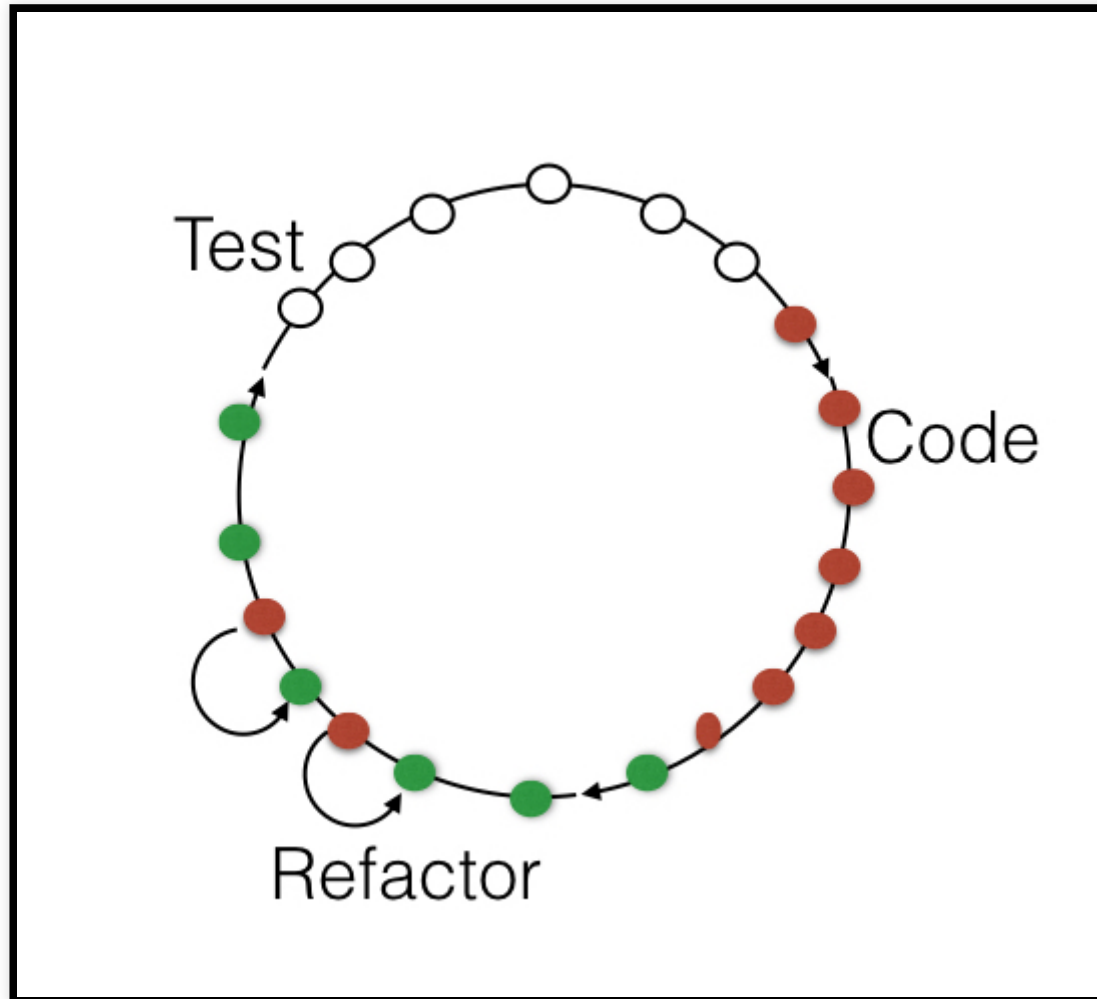
- **Red**: Write a failing test
- **Green**: Make it pass
- **Refactor**: Clean up your code

TDD according to Brian

- **Red**: Learn what it's like to use your code
- **Green**: Learn one way to implement the code
- Refactor: Make code you are proud of

(and don't forget to refactor your tests, too)

Testing During Development



The cards project

something to test

for those of you following along at home

```
$ git clone -b pycon_2018 https://github.com/okken/cards.git
$ cd cards
$ python3.6 -m venv venv --prompt cards
$ source venv/bin/activate # venv\Scripts\activate (if
Windows)
(cards) $ pip install -r requirements_dev.txt
```

```
$ cards add -o okken "Prepare for PyCon talk"
$ cards add -o okken "Order stickers"
$ cards add -o okken "Order business cards"
$ cards add -o okken "pack"
$ cards update 2 --done True
$ cards update 3 --done True
$ cards list
```

ID	owner	done	summary
1	okken		Prepare for PyCon talk
2	okken	x	Order stickers
3	okken	x	Order business cards
4	okken		pack

cards

src

cards

__init__.py

cardsdb.py

cli.py

tests

api

__init__.py

conftest.py

test_tracer_bullets.py

....

cli

__init__.py

conftest.py

test_alac.py

pytest

```
(cards) $ pytest --cov=src
===== test session starts =====
tests/api/test_alac.py . [ 2%]
tests/api/test_list_filter.py ..... [ 50%]
tests/api/test_tracer_bullets.py ..... [ 67%]
tests/cli/test_alac.py . [ 70%]
tests/cli/test_list_format.py ..... [ 85%]
tests/cli/test_tracer_bullets.py ..... [100%]
----- coverage: -----
```

Name	Stmts	Miss	Branch	BrPart	Cover
src/cards/__init__.py	2	0	0	0	100%
src/cards/cardsdb.py	45	0	20	0	100%
src/cards/cli.py	58	0	14	0	100%
TOTAL:	105	0	34	0	100%

pytest allows you to run a subset of tests

```
$ # one directory  
$ pytest tests/cli
```

```
$ # one test module  
$ pytest tests/cli/test_tracer_bullets.py
```

```
$ # one test function  
$ pytest tests/cli/test_tracer_bullets.py::test_count
```

Some other ways to run a subset of tests

```
(cards) $ pytest --help
```

```
...
```

<code>-k EXPRESSION</code>	just tests matching this expression
<code>-m MARKEXP</code>	run tests w/ given mark expression
<code>-x, --exitfirst</code>	exit on first error/failed test
<code>--maxfail=num</code>	exit after first num failures/errors.
<code>--lf, --last-failed</code>	rerun failed tests from last run
<code>--ff, --failed-first</code>	same, but then run the rest
<code>--nf, --new-first</code>	run new test files, then the rest

More development speedups

- Fixtures: setup, teardown, resource and test data initialization, ...
- Parametrization: many test cases using the same test function
- Hooks and Plugins: the sky is the limit

CLI vs Visual Testing

```

(cards) $ pytest -x -v -k bullet --cov=src tests/cli
===== test session starts =====
platform darwin -- Python 3.7.0b3, pytest-3.5.1, py-1.5.3, pluggy-0.
6.0 -- /Users/okken/projects/cards/venv/bin/python3
cachedir: .pytest_cache
rootdir: /Users/okken/projects/cards, inifile: pytest.ini
plugins: cov-2.5.1
collected 13 items / 7 deselected

tests/cli/test_tracer_bullets.py::test_add PASSED [ 16%]
tests/cli/test_tracer_bullets.py::test_list PASSED [ 33%]
tests/cli/test_tracer_bullets.py::test_list_filter PASSED [ 50%]
tests/cli/test_tracer_bullets.py::test_count PASSED [ 66%]
tests/cli/test_tracer_bullets.py::test_update PASSED [ 83%]
tests/cli/test_tracer_bullets.py::test_delete PASSED [100%]

----- coverage: platform darwin, python 3.7.0-beta-3 -----
--
Name                               Stmts   Miss Branch BrPart  Cover
-----
src/cards/__init__.py               2        0      0      0    100%
src/cards/cardsdb.py               45        5     20      3     85%
src/cards/cli.py                   58        5     14      3     86%
-----
TOTAL                             105     10     34      6     86%

===== 6 passed, 7 deselected in 0.17 seconds =====
(cards) $ _

```

vs PyCharm

cards [~/projects/cards] - .../tests/api/test_tracer_bullets.py [cards]

py.test in tests

cards tests api test_tracer_bullets.py

Project cards ~/projects/cards

- src
 - cards
 - __init__.py
 - cardsdb.py
 - cli.py
 - tests
 - api
 - conftest.py
 - test_alac.py
 - test_list_filter.py
 - test_tracer_bullets.py
 - cli
 - __init__.py
 - conftest.py
 - test_alac.py
 - test_list_format.py

```
63 assert 2 == count
64
65
66 def test_update(db_non_empty):
67     # GIVEN a card known to be in the db
68     db = db_non_empty
69     all_cards = db.list_cards()
70     a_card = all_cards[0]
71
72     # WHEN we update() the card with new info
73     db.update(a_card.id, Card(owner='okken', done=True))
74
75     # THEN we can retrieve the card with get() and
76     # and it has all of our changes
77     updated_card = db.get(a_card.id)
78     expected = Card(summary=a_card.summary, owner='okken', done=True)
79     assert expected == updated_card
80
81
82 def test_delete(db_empty):
83     # GIVEN a db with 2 items
```

Run: py.test in tests

Tests passed: 40 of 40 tests - 112 ms

Test Results

- tests 112 ms
 - api 18 ms
 - test_alac 6 ms
 - test_list_filter 0 ms
 - test_tracer_bullets 12 ms
 - test_add 1 ms
 - test_get 1 ms
 - test_list 2 ms
 - test_count 4 ms
 - test_update 1 ms

rootdir: /Users/okken/projects/cards, inifile: pytest.ini
plugins: cov-2.5.1collected 40 items

api/test_alac.py [2%]
api/test_list_filter.py [50%]
api/test_tracer_bullets.py [67%]
cli/test_alac.py [70%]
cli/test_list_format.py [85%]
cli/test_tracer_bullets.py [100%]

===== 40 passed in 0.68 seconds =====
Process finished with exit code 0

4: Run 5: Debug 6: TODO 9: Version Control Python Console Terminal

Tests passed: 40 (a minute ago)

19:1 LF UTF-8 Git: pycon_2018

cards [~/projects/cards] - .../tests/api/test_tracer_bullets.py [cards]

py.test in tests

git integration

Project

cards ~/projects/cards

src

cards

__init__.py

cardsdb.py

cli.py

tests

api

conftest.py

test_alac.py

test_list_filter.py

test_tracer_bullets.py

cli

__init__.py

conftest.py

test_alac.py

test_list_format.py

63 assert 2 == count

run controls

editor

breakpoints

run/debug control

Run: py.test in tests

Tests passed: 40 of 40 tests - 112 ms

Test Results

tests

api

test_alac

test_list_filter

test_tracer_bullets

test_add

test_get

test_list

test_count

test_update

112 ms

112 ms

18 ms

6 ms

0 ms

0 ms

12 ms

1 ms

1 ms

2 ms

4 ms

rootdir: /Users/okken/projects/cards, :
plugins: cov-2.5.1collected 40 items

api/test_alac.py

api/test_list_filter.py

api/test_tracer_bullets.py

cli/test_alac.py

cli/test_list_format.py

cli/test_tracer_bullets.py

===== 40 passed in 0.68 seconds =====

Process finished with exit code 0

pytest output

REPL

Terminal

auto-test

test times

Event Log

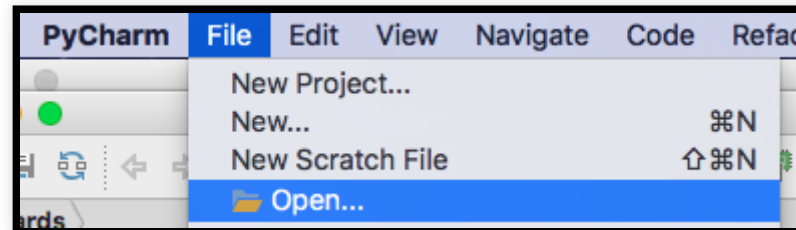
Tests passed: 40 (a minute ago)

19:1 LF UTF-8 Git: pycon_2018

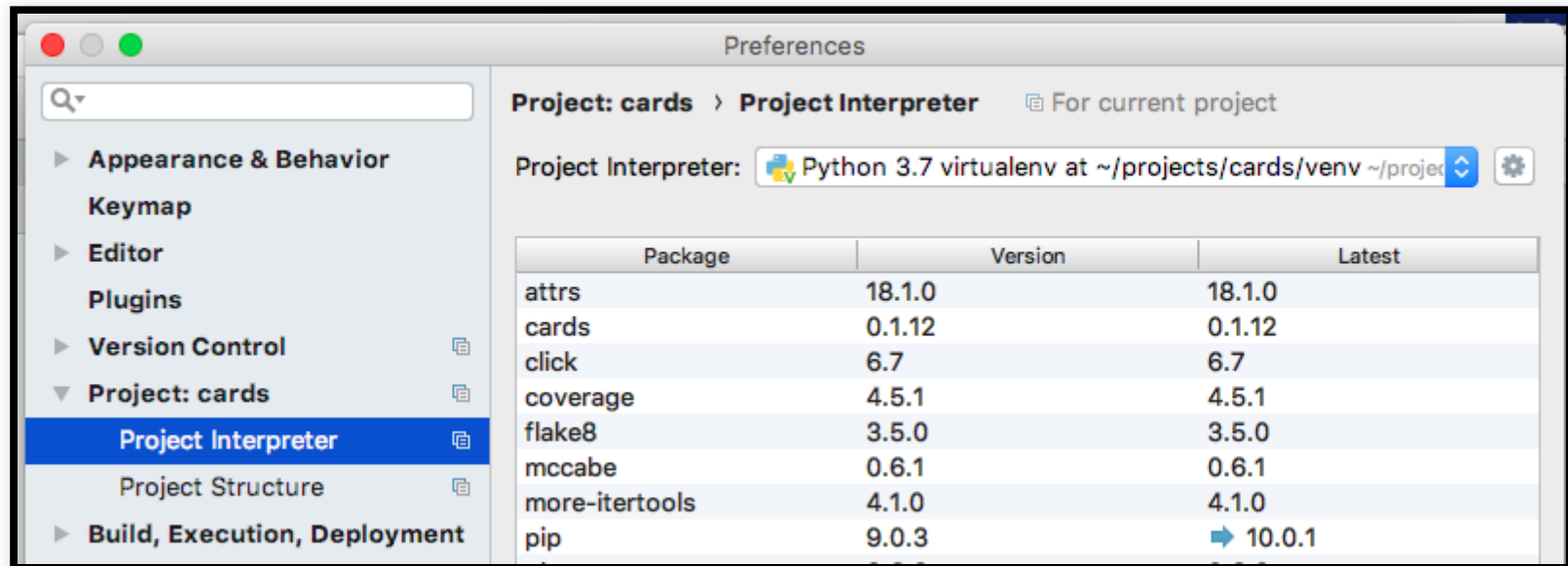
Some Setup

- PyCharm Community edition
- Use File->Open for existing projects
- Check the interpreter setting
- Check the default test runner

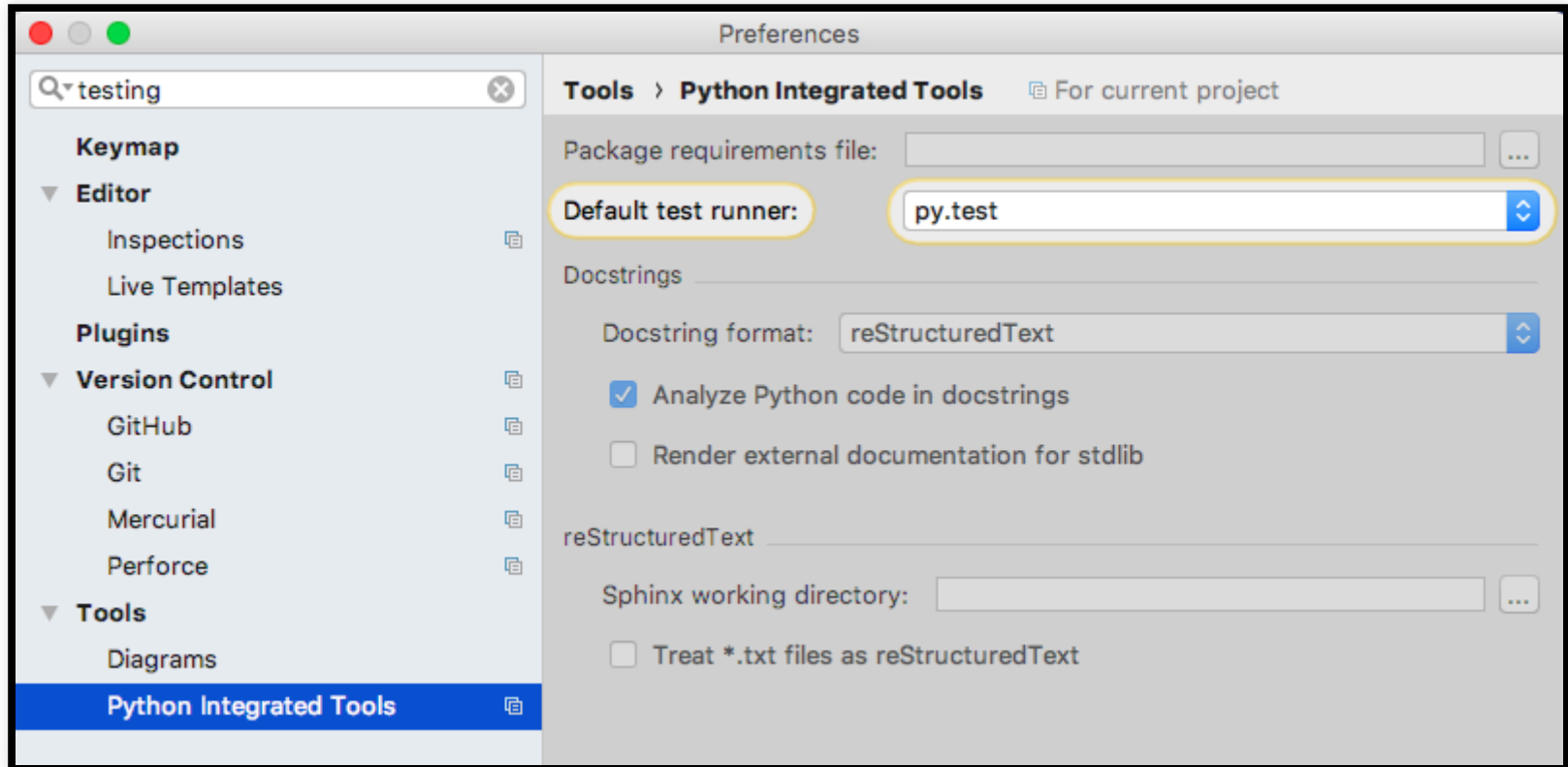
Use File->Open for existing projects



Check the interpreter setting



Check the default test runner



Demo

- run at different levels
- see test durations
- auto-running tests
- run only failing tests
- jump directly the test failure
- see tests and code at the same time (TDD mode)
- debug tests and code together
- run REPL during a debug session

More info

- PyCharm: jetbrains.com/pycharm/
- Python Testing with pytest
 - pragprog.com/book/bopytest
- pytest
 - docs.pytest.org
 - stackoverflow.com/search?q=pytest
- Lessons about testing and TDD from Kent Beck
 - testandcode.com/23
- Twitter
 - [@brianokken](#), [@testpodcast](#), testandcode.com
 - [@paulweveritt](#), [@pycharm](#)